

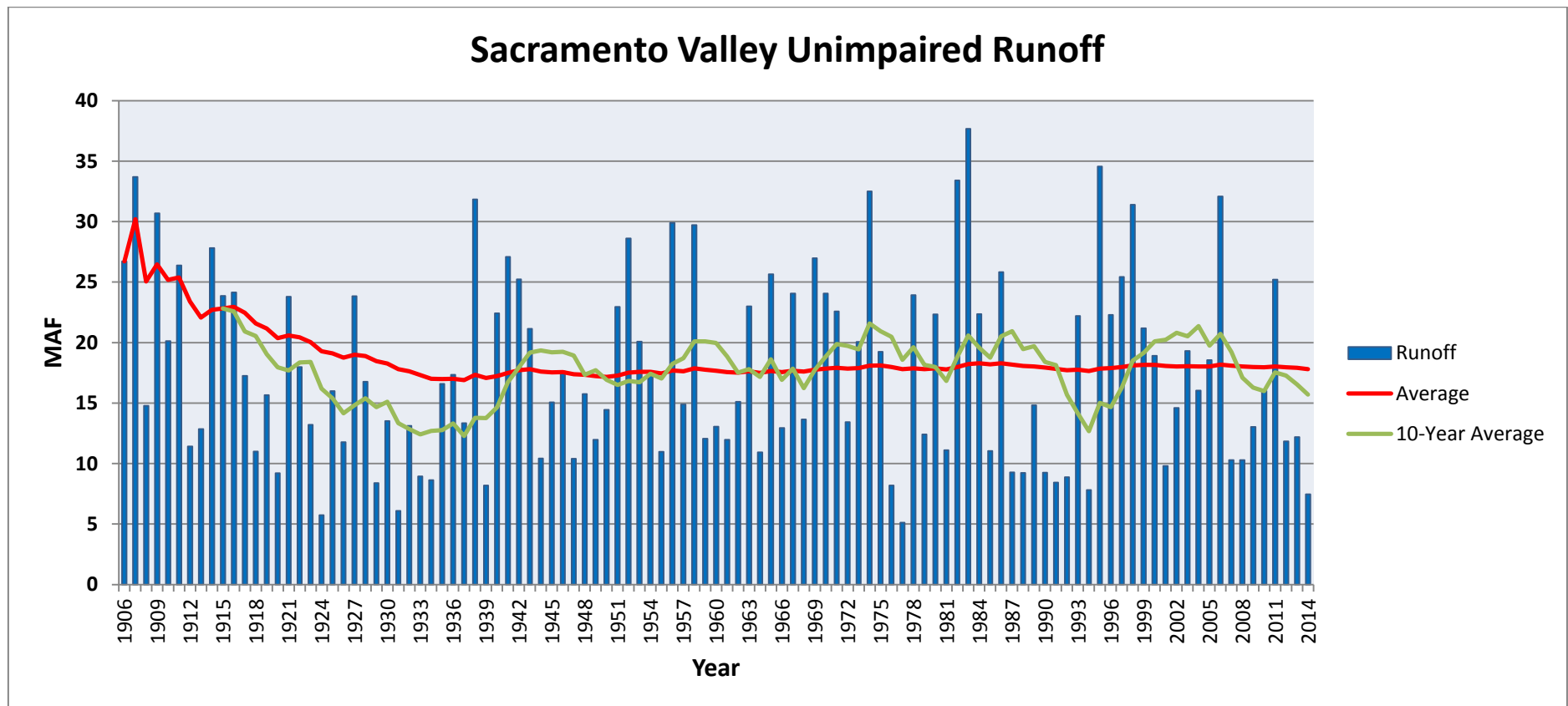
California River Indices

Hydrology

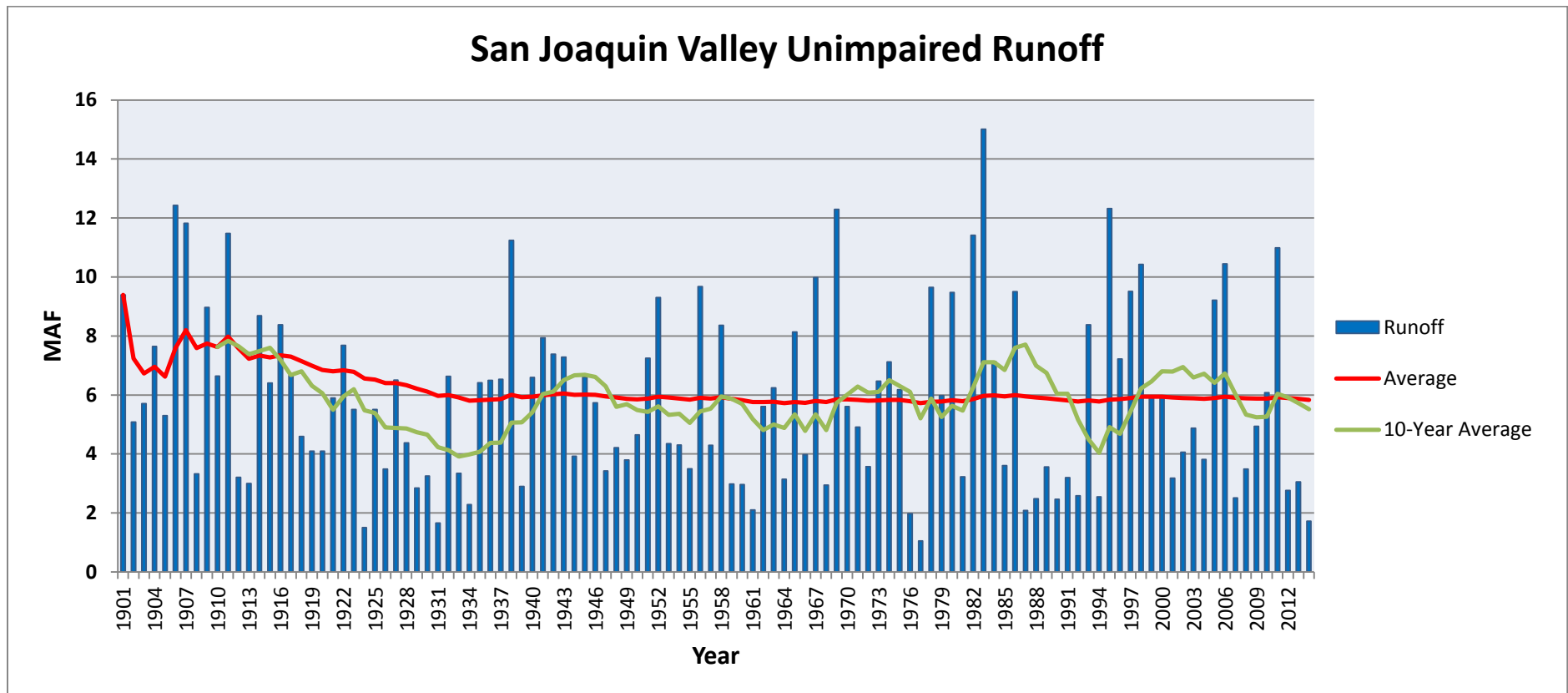
California's water development has generally been dictated by extremes of droughts and floods. The six-year drought of 1929-34 established the criteria commonly used to plan storage capacity or water yield of large Northern California reservoirs. The influence of climatic variability on California's water supplies is much less predictable than the influences of geographic and seasonal variability, as evidenced by the recent historical records of precipitation and runoff. For example, the state's average annual runoff includes the all-time low of 15 maf in 1977 and the all-time high of over 135 maf in 1983. Floods and droughts occur often, sometimes in the same year. The January 1997 flood was followed by a record-setting dry period from February through June, and the flooding of 1986 was followed by six years of drought (1987-92).

Figures showing the estimated annual unimpaired runoff of the Sacramento and San Joaquin River basins illustrate climatic variability. Because these basins provide much of the state's water supply, their hydrology is often used as indices of water year classification systems.

Unimpaired runoff represents the natural water production of a river basin, unaltered by upstream diversions, storage, and export of water to or import of water from other basins.



Sacramento River Runoff is the sum (in maf) of Sacramento River at Bend Bridge, Feather River inflow to Lake Oroville, Yuba River at Smartville, and American River inflow to Folsom Lake. The water year sum is also known as the Sacramento River Index, and was previously referred to as the “4 River Index” or “4 Basin Index”. It was previously used to determine year type classifications under SWRCB Decision 1485.



San Joaquin River Runoff is the sum of Stanislaus River inflow to New Melones Lake, Tuolumne River inflow to New Don Pedro Reservoir, Merced River inflow to Lake McClure, and San Joaquin River inflow to Millerton Lake (all in maf).

Water Year Classification

Water year classification systems provide a means to assess the amount of water originating in a basin. Because water year classification systems are useful in water planning and management, they have been developed for several hydrologic basins in California. The Sacramento Valley 40-30-30 Index and the San Joaquin Valley 60-20-20 Index were developed by the State Water Resources Control Board (SWRCB) for the Sacramento and San Joaquin River hydrologic basins as part of SWRCB's Bay-Delta regulatory activities. Both systems define one "wet" year classification, two "normal" classifications (above and below normal), and two "dry" classifications (dry and critical), for a total of five water year types.

Sacramento Valley Water Year Index = $(0.4) \times \text{Current Apr-Jul runoff forecast (in maf)} + (0.3) \times \text{Current Oct-Mar runoff (in maf)} + (0.3) \times \text{Previous Water Year's Index}$ (*if the Previous Water Year's Index exceeds 10.0, then 10.0 is used*).

This index, originally specified in the 1995 SWRCB Water Quality Control Plan, is used to determine the Sacramento Valley water year type as implemented in SWRCB D-1641. Year types are set by first of month forecasts beginning in February. Final determination is based on the May 1st 50 percent exceedance forecast.

Sacramento Valley Yearly Hydrologic Classifications are:

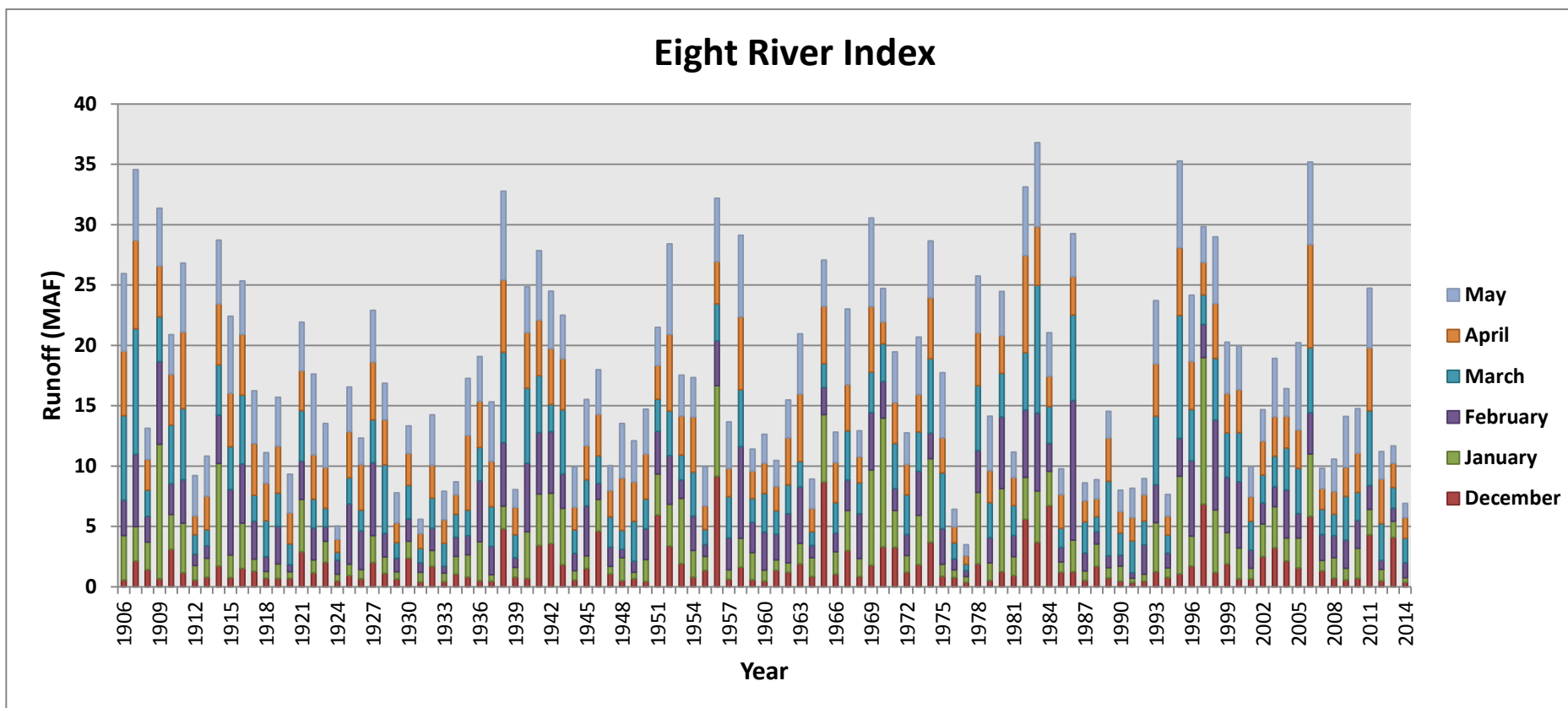
<u>Year Type</u>	<u>Water Year Index</u>
Wet	Equal to or greater than 9.2
Above Normal	Greater than 7.8, and less than 9.2
Below Normal	Greater than 6.5, and equal to or less than 7.8
Dry	Greater than 5.4, and equal to or less than 6.5
Critical	Equal to or less than 5.4

San Joaquin Valley Water Year Index = $(0.6) \times \text{Current Apr-Jul runoff forecast (in maf)} + (0.2) \times \text{Current Oct-Mar runoff (in maf)} + (0.2) \times \text{Previous Water Year's Index}$ (*if the Previous Water Year's Index exceeds 4.5, the 4.5 is used*).

This index, originally specified in the 1995 SWRCB Water Quality Control Plan, is used to determine the San Joaquin Valley water year type as implemented in SWRCB D-1641. Year types are set by first of month forecasts beginning in February. Final determination for San Joaquin River flow objectives is based on the May 1st 75 percent exceedance forecast.

San Joaquin Valley Yearly Hydrologic Classifications are:

<u>Year Type</u>	<u>Water Year Index</u>
Wet	Equal to or greater than 3.8
Above Normal	Greater than 3.1, and less than 3.8
Below Normal	Greater than 2.5, and equal to or less than 3.1
Dry	Greater than 2.1, and equal to or less than 2.5
Critical	Equal to or less than 2.1



Eight River Index = *Sacramento River Runoff* + *San Joaquin River Runoff*.

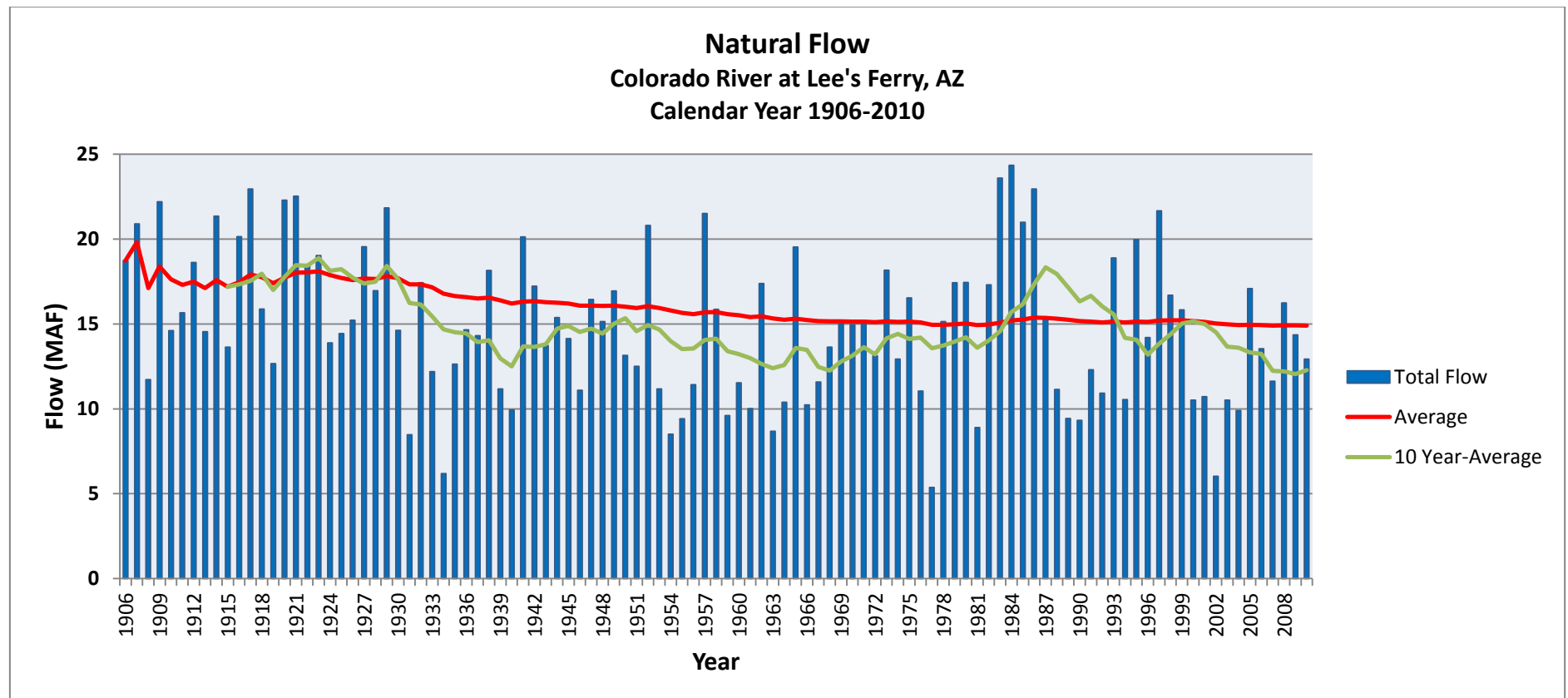
This Index is used from December through May to set flow objectives as implementer in SWRCB Decision 1641.

Colorado River

The Colorado River is an interstate and international river. Its mean annual unimpaired flow is about 15 maf. The river, which has its headwaters in Wyoming's Green River Basin, crosses through parts of seven states before flowing into Mexico and terminating at the Gulf of California.

Defining a representative drought in Southern California is complicated by the region's access to imported supplies from the Colorado River. Three major facilities—USBR's All American Canal, MWDSC's Colorado River Aqueduct, and Palo Verde Irrigation District's main canal—convey water from the Colorado River to California users. The Colorado River watershed is large (about 244,000 square miles, or roughly 10 times the size of the Sacramento River watershed) and experiences hydrologic conditions different than California's. As a result, Southern California's water supply may be buffered from the effects of severe drought in Northern California.

See figure on the next page.



The figure presents Colorado River unimpaired flow at the Lee's Ferry interstate compact measurement point to illustrate the river basin's hydrology.